



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

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Report Nos.: 50-327/94-08 and 50-328/94-08

Licensee: Tennessee Valley Authority
6N 38A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Docket Nos.: 50-327 and 50-328

License Nos.: DPR-77 and DPR-79

Facility Name: Sequoyah 1 and 2

Inspection Conducted: March 7-11, 1994

Inspector: D. W. Jones
D. W. Jones

4/8/94
Date Signed

Approved by: T. R. Decker

T. R. Decker, Chief
Radiological Effluents and Chemistry Section
Radiological Protection and Emergency Preparedness Branch
Division of Radiation Safety and Safeguards

4/8/94
Date Signed

SUMMARY

Scope:

This routine, announced inspection was conducted in the areas of primary water chemistry, training, liquid radwaste processing, emergency response training exercise, post-accident sampling systems, and followup on previous inspection findings.

Results:

In the areas inspected, no violations or deviations were identified.

The licensee had implemented an effective water chemistry control program. The computerized Chemistry Data Management system and the Laboratory Quality Assurance/Quality Control program were considered to be Chemistry program strengths (Paragraph 2).

The licensee had implemented an effective training program for chemistry technicians and personnel involved in shipment of radioactive material (Paragraph 3).

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The liquid radwaste treatment system was being used to reduce releases of radioactivity in liquid effluents and the radiation doses from liquid effluents were closely monitored on a monthly basis to ensure that they were maintained well below regulatory limits (Paragraph 4).

A training exercise was conducted during the week of this inspection and the licensee was successful in meeting the exercise objective of reducing the time required to identify which steam generator had developed a tube leak (Paragraph 5).

The licensee had completed most of the design work for planned improvement modifications to the Post-Accident Sampling Systems but the scheduled completion dates had been extended approximately one year pending availability of funding during fiscal year 1995. Descriptions of those modifications and planned completion dates for each had previously been submitted to the NRC Region II Office via letter dated September 20, 1993. The licensee was requested to update that submittal (Paragraph 6).

An Inspector Followup Item regarding final assessment and corrective actions for a hot particle event will remain open pending NRC review of the licensee's implementation of those planned corrective actions (Paragraph 7).

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- †*D. Adams, Program Manager, Chemistry
- D. Amos, Nuclear Chemist, Chemistry
- A. Barringer, Nuclear Chemist, Chemistry
- *D. Cross, Manager, Waste and Water Processing
- †*R. Driscoll, Manager, Site Quality
- †*B. Fender, Manager, Technical Support, Chemistry
- †T. Flippo, Manager, Site Support
- R. Goodman, Manager, Technical Training
- †O. Hayes, Acting Manager, Operations
- †*C. Kent, Manager, Radiological Control and Chemistry
- D. Nichols, Health Physicist, Radwaste
- J. Osborne, Manager, Environmental Control
- *M. Palmer, Manager, Radiological Protection
- †*L. Poage, Manager, Audits and Assessment, Nuclear Assurance
- *K. Powers, Site Vice President
- J. Reagan, Health Physicist, Radwaste
- †G. Rich, Manager, Chemistry
- *R. Richie, Manager, Operations, Chemistry
- †R. Shell, Manager, Site Licensing
- L. Strickland, Nuclear Chemist, Chemistry
- G. Taylor, Radiochemical Analyst, Chemistry
- †*R. Thompson, Manager, Compliance Licensing
- †*C. Whittemore, Licensing Engineer, Compliance Licensing

Other licensee employees contacted included engineers, technicians, and administrative personnel.

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- †W. Holland, Senior Resident Inspector
- *P. Kellogg, Section Chief, Division of Reactor Projects
- *G. Schnebli, Resident Inspector, Browns Ferry Nuclear Plant
- *S. Shaeffer, Resident Inspector

†Attended entrance interview.

*Attended exit interview.

2. Primary Water Chemistry (84750)

Technical Specifications (TSs) 3/4.4.7 and 3.4.4.8 for both units described the operational and surveillance requirements for reactor coolant chemistry and specific activity. Maximum concentrations and minimum sampling frequencies were specified for dissolved oxygen, chloride, fluoride, and specific activity during designated operational modes. Action statements applicable to specific modes were provided for conditions in which the concentration limits were exceeded.

The inspector reviewed the licensee's Site Standard Practice SSP-13.1 "Conduct of Chemistry" which described the overall chemistry program for the facility. SSP-13.1 included provisions for sampling and analyzing reactor coolant at the frequency and for the parameters required by the TSs, and for implementing, with few exceptions, the Electric Power Research Institute (EPRI) guidelines for PWR primary water chemistry. Appendix E to SSP-13.1 listed, for each parameter to be monitored, the operating goals and sampling frequencies during various operational modes. Action limits were given for most but not all listed parameters. Guidance was provided for actions to be taken if analytical results exceeded prescribed action limits or if trends were observed. SSP-13.1 also included provisions for a computerized Chemistry Data Management (CDM) system and for a Laboratory Quality Assurance/Quality Control (QA/QC) program.

The inspector reviewed selected analytical results recorded in the CDM system for Unit 2 reactor coolant samples taken during March 1-7, 1994. The selected parameters included pH, dissolved oxygen, chloride, fluoride, boron, dissolved hydrogen, lithium, silica, sulfate, aluminum, magnesium, calcium plus magnesium, total suspended solids, gross activity, dose equivalent iodine-131, crud total gamma activity, and tritium. The inspector also reviewed plots of analytical results for Unit 2 reactor coolant generated since the October 1993 restart of that unit. Plots for the following parameters were reviewed: pH, dissolved oxygen, chloride, fluoride, dissolved hydrogen, lithium, gross activity, and dose equivalent iodine-131 (DEI-131). The DEI-131 was typically $4 \times 10^{-3} \mu\text{Ci/ml}$. The inspector determined that those parameters were generally within their operating goals and well within their action limits as prescribed in SSP-13.1 Appendix E.

The licensee's Laboratory QA/QC program included the use of control charts to monitor the quality of reactor coolant analyses. The inspector reviewed the control charts for pH, chloride, fluoride, and boron, and determined that normalized results from analyses of prepared standards were plotted on control charts constructed in accordance with procedure O-TI-CEM-260-020.5 "Quality Control Chart Preparation". Investigations of trends and spurious QC check results were initiated in accordance with the guidance provided by procedure O-TI-CEM-260-020.2 "Control Chart Evaluations and Corrective Actions".

Based on the above reviews, it was concluded that the licensee had implemented an effective water chemistry control program. The computerized Chemistry Data Management system and the Laboratory QA/QC program were considered to be Chemistry program strengths.

No violations or deviations were identified.

3. Training (84750 and 86750)

TSs 6.4 for both units required the licensee to maintain a retraining and replacement training program for the facility staff. The licensee's

training program for the Chemistry staff was administered by the Site Nuclear Training organization and was described in procedure TRN-21 "Chemistry Personnel Training". The program included provisions for initial basic skills training, in-plant qualification, and continuing training. The initial training curriculum included: procedures and practices; plant systems; fundamentals of math, chemistry, nuclear physics, and counting statistics; plant chemistry; analytical theory and instrumentation; countroom theory and instrumentation; gamma spectroscopy; and quality assurance/quality control. The in-plant qualification consisted of demonstrating proficiency in performing specific position related assigned tasks. The continuing training topics included systems training, fundamentals refresher, quality assurance/quality control, and current industry events. The program provided for a minimum of 80 hours of continuing training on a biennial basis. The inspector reviewed the records for continuing training of two chemistry technicians and determined that both had received at least 40 hours of refresher training during 1993.

The licensee's training program for personnel involved in preparation of radioactive material for shipment was administered by the Radwaste Group and was described in the "Radioactive Material Shipment Manual" (RMSM). The program provided for training and retraining in applicable NRC and Department of Transportation (DOT) regulations, facility instructions, disposal site criteria, and state requirements. Appendices to the RMSM listed the specific topics in which personnel were required to be trained for the various activities related to shipment of radioactive material. Retraining was required at an 18 month frequency. The inspector reviewed the training records for the two individuals authorized to sign shipping papers and determined that both had received refresher training at the prescribed frequency.

Based on the above reviews, it was concluded that the licensee had implemented an effective training program for chemistry technicians and personnel involved in shipment of radioactive material.

No violations or deviations were identified.

4. Liquid Radwaste Processing (84750)

TSs 6.8.5.f.6 for both units required the licensee to establish, implement, and maintain a program for the control of radioactive effluents. The program was required to be described in the Offsite Dose Calculation Manual (ODCM) and to be implemented by operating procedures. The program was also required to include limitations on the operability and use of the liquid and gaseous effluent treatment systems to ensure the use of those systems to reduce releases of radioactivity when the projected doses in a 31-day period would exceed 2 percent of the guidelines for the annual dose or dose commitment contained in Appendix I to 10 CFR Part 50. Section 1/2.2.1.3 of the ODCM specified that the liquid radwaste treatment system would be used to reduce the

radioactive materials in liquid wastes prior to their discharge when the projected doses due to the liquid effluent to unrestricted areas would exceed 0.06 mrem per reactor unit to the total body or 0.2 mrem per reactor unit to any organ in a 31-day period. That section of the ODCM also specified that doses due to liquid releases from each unit to unrestricted areas would be projected at least once per 31 days, in accordance with the methods and parameters in the ODCM.

The inspector toured the liquid radwaste storage and treatment areas and discussed liquid waste treatment operations with cognizant licensee representatives. The licensee identified and described the operation of the major components of the systems. The equipment used for waste water treatment included four filtering vessels and four demineralizer vessels which could be configured in various flowpath arrangements for optimum decontamination efficiency depending on the source of the water being treated. Filters were available to remove particulates larger than 100μ ($1 \mu = 1 \times 10^{-6}$ meters) or as small as 0.2μ . Activated charcoal, cation resin, and mixed resin were available to chemically reduce the level of contaminants in the liquid waste prior to release. The licensee indicated that the treatment system was generally operated on a daily basis to process the liquid radwaste as it was generated.

The inspector reviewed procedure SI-422.1 "Monthly 10 CFR 50 Appendix I Dose Calculations Liquid and Gaseous Effluents" and determined that it included provisions for calculating the total body and maximum organ radiation doses from liquid effluents each month and the projected doses for the next month. The dose calculations for the month of February 1994 were reviewed and the doses were found to be a small percentage of the TS limits.

Based on the above reviews and observations, it was concluded that the liquid radwaste treatment system was being used to reduce releases of radioactivity in liquid effluents and that the radiation doses from liquid effluents were closely monitored on a monthly basis to ensure that they were maintained well below regulatory limits.

No violations or deviations were identified.

5. Emergency Response Training Exercise (82206)

The licensee informed the inspector that training exercise was to be conducted during the week of this inspection. Based on their evaluation of a steam generator tube rupture event at another facility, the licensee determined that a series of training exercises should be conducted to evaluate their own capability to identify which of a units four steam generators had developed a tube leak. The inspector observed the drill conducted on March 8, 1994, which was the second of five planned training exercises. The drill was initiated by a telephone call from an Operations Simulator Crew Instructor to the Chemistry Laboratory. The simulator instructor requested the laboratory to sample steam generator blowdowns and to survey the steam generator blowdown and

steam lines. Simulated sampling and surveys were performed by laboratory technicians. Four spiked samples with varied activity concentrations had been prepared for use as simulated blowdown samples. The samples were analyzed for gamma radiation activity by use of the spectrometers in the laboratory count room. The leaking steam generator was identified within 35 minutes and the drill was concluded by reporting the results to the simulator instructor. The first such drill was completed in 48 minutes. The improved response time was the result of improved proficiency in obtaining and analyzing the steam generator blowdown samples.

Based on the above observations, it was concluded that the licensee successfully met the exercise objective of reducing the time required to identify which steam generator had developed a tube leak.

No violations or deviations were identified.

6. Post-Accident Sampling Systems (84750)

TSs 6.8.5.e for both units required the licensee to establish, implement, and maintain a program which would ensure the capability to obtain and analyze samples of reactor coolant, radioactive iodines and particulates in plant gaseous effluents, and containment atmosphere under accident conditions. The program was required to include training of personnel, procedures for sampling and analysis, and provisions for maintenance of sampling and analytical equipment.

During the inspection conducted on June 21-25, 1993, (Reference Inspection Report Nos. 50-327/93-29 and 50-328/93-29) the licensee was requested to provide the NRC Region II Office a letter indicating the following: what actions are being taken to make the Post-Accident Sampling Systems (PASS) equipment operable; what will the policy be for timeliness in repairing the equipment should it become inoperable in the future; and what actions are being taken with regard to training of personnel to operate the PASS. That request was based on NRC management review of previous inspection findings regarding the licensee's continuing problems with the reliability of the in-line measurement components of the PASS and with training of personnel to operate the PASS. The licensee provided the requested information in a letter dated September 20, 1993. In that letter the licensee described four modifications designed to either enhance the operation of PASS equipment or replace inoperable equipment. The then currently scheduled start and completion dates for each modification were also provided.

During this inspection the licensee provided the inspector with an updated status of the PASS improvement modifications. The inspector noted that most of the design work was complete but the scheduled completion dates had been extended approximately one year pending availability of funding during fiscal year 1995. The licensee was advised that the inspector did not have the latitude to accept changes to what the NRC viewed as written licensee commitments and the licensee

was requested to submit those changes to the NRC Region II Office. The licensee acknowledged the inspector's request.

No violation or deviations were identified.

7. Followup on Previous Inspection Findings (92701)

(Open) Inspector Followup Item (IFI) 50-327, 328/94-07-01, Review of licensee's final assessment and corrective actions regarding a hot particle event. On February 2, 1994, the licensee notified the NRC Region II Office that a radioactive particle (hot particle) was detected on an individual's clothing as the individual exited the radiological control area on January 31, 1994. As discussed in NRC Inspection Report 50-327, 328/94-07, the licensee determined that the individual had been working on non-contaminated equipment located on the roof of the Auxiliary Building. The entire Auxiliary Building roof was surveyed and eleven additional radioactive particles were discovered. The particle with the most activity was found to contain 12.8 μCi of activation products and each of the other particles contained less than 0.5 μCi of mixed fission and activation products. The particle found on the individual's clothing contained 0.063 μCi . The skin and total body radiation doses to the individual were well below regulatory limits and no internal deposition occurred. At the time of that inspection the licensee's investigation of this event had not been completed but the particles were suspected to have been exhausted from the Auxiliary Building Ventilation System, which, as described in the Final Safety Analysis Report, was an unfiltered discharge pathway. Corrective actions to prevent further releases of radioactive particles through the Auxiliary Building Ventilation System were being formulated and additional surveys were being performed to determine whether radioactive particles had been deposited anywhere other than the roof of the Auxiliary Building.

During this inspection the licensee's incident investigation report for this event and the results from the site and owner-controlled area environmental surveys were reviewed. The incident investigation report indicated that the most probable source of the particles was the Fuel Transfer Canal which was known to contain particles similar to those found on the roof of the Auxiliary Building. The licensee concluded, again as documented in the report, that the particles became airborne during recent maintenance activities in the Fuel Transfer Canal and were captured by the Fuel Handling Ventilation System which discharges into the Auxiliary Building Ventilation System. The report and the results from the additional surveys indicated that no additional radioactive particles were detected on the roofs of other buildings adjacent to the Auxiliary Building, on the ground around those buildings, or in soil samples taken from areas within the site and owner-controlled areas surrounding the entire plant.

The licensee's planned corrective actions to prevent further releases of radioactive particles through the Auxiliary Building Ventilation System

were also delineated in the incident investigation report. Those actions included:

- Perform an engineering evaluation of the Auxiliary Building and Fuel Handling Ventilation systems and make recommendations to prevent capture and exhausting of radioactive particles from the Auxiliary Building Vent.
- Revise procedures to establish additional controls for work in areas which could result in radioactive particles being captured by Fuel Handling Ventilation intake.
- Perform additional environmental sampling and document results.
- Evaluate the potential for continuing release of radioactive particles through the Fuel Handling Exhaust Ventilation.
- Coordinate any Auxiliary Building Gas Treatment System testing, Fuel Handling Damper testing or train swapping with Radiological Control.

This IFI will remain open pending NRC review of the licensee's completion and implementation of the above corrective actions.

8. Exit Interview

The inspection scope and results were summarized on March 11, 1994, with those persons indicated in Paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results listed above. No dissenting comments were received from the licensee. Proprietary information is not contained in this report.

<u>Item</u>	<u>Status</u>	<u>Description and Reference</u>
50-327, 328/94-07-01	Open	IFI - Review of licensee's final assessment and corrective actions regarding a hot particle event (Paragraph 7).